COMPLETE LISTING OF THE CLAIMS

The following lists all of the claims that are or were in the above-identified patent application.

1. (Currently Amended) An interconnect system comprising:

a first circuit unit containing a first modulator capable of modulating a first optical signal output from the first ~~chip~~ circuit unit; and

a second circuit unit containing a first detector capable of detecting modulation of the first optical signal to extract a first information stream.

2. (Currently Amended) The system of claim 1, wherein:

the second circuit unit further comprises a second modulator capable of modulating a second optical signal; and

the first circuit unit further comprises a second detector capable of detecting modulation of the second optical signal to extract a second information stream.

3. (Currently Amended) The system of claim 1, wherein the first circuit unit further comprises:

a photonic bandgap crystal~~; and a line defect in the photonic bandgap crystal~~, wherein

the first modulator comprises a ~~point~~ first defect within the photonic bandgap crystal and an electrode adjacent to the first defect, wherein the ~~point~~ first defect acts as a resonator for a wavelength of the first optical signal and has an optical property that varies with a voltage applied to the electrode.

4. (Original) The system of claim 1, wherein the first detector comprises a photodiode at a defect within a photonic bandgap crystal, wherein the defect acts as a resonator for a wavelength of the first optical signal.

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5. (Original) The interconnect system of claim 1, wherein the first circuit unit is integrated on a first chip and the second circuit unit is integrated on a second chip.

6. (Original) The interconnect system of claim 5, further comprising a first light source that is external to the first chip and provides the first optical signal to the first circuit unit.

Claims 7 to 16 (Canceled)

17. (Original) An interface for input/output from an integrated circuit, comprising:

a photonic bandgap crystal;

a line defect in the photonic bandgap crystal;

a point defect within the photonic bandgap crystal; and

an electrical element adjacent the defect.

18. (Original) The interface of claim 17, wherein the electrical element comprises an electrode adjacent to the point defect, wherein the point defect acts as a resonator for a wavelength of an optical signal and has an optical property that varies with a voltage applied to the electrode.

19. (Original) The interface of claim 17, wherein the electrical element comprises a photodiode within the defect.

Claims 20 to 39 (Canceled)

Please add the following new claims.

40. (New) The interface of claim 17, further comprising a plurality of point defects within the bandgap crystal and adjacent to the line defect, wherein each of the point defects acts as a drop filter for a different frequency of light.

41. (New) The system of claim 3, wherein the first circuit unit further comprises a second defect that acts as a waveguide for the first optical signal in the photonic bandgap crystal, the first defect being adjacent to the second defect.

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42. (New) The system of claim 41, wherein the first defect comprises a point defect.

43. (New) The system of claim 42, wherein the second defect comprises a line defect.

44. (New) The system of claim 1, wherein the first circuit further comprises:

a photonic bandgap crystal containing a plurality of defects, wherein each of the defects acts as a resonator for a different wavelength of light, and a material in each of the defects has a refractive index that depends on an electric field in the material; and

a plurality of electrodes respectively adjacent to the plurality of defects, wherein an electrical signal applied to one of the electrodes changes the electric field in a corresponding one of the defects.

45. (New) The modulator of claim 43, wherein the material in the point defect comprises lithium niobate.

46. (New) The system of claim 1, wherein the first circuit comprises:

a first waveguide for an input optical signal that includes a plurality of frequency components;

a plurality of drop filters positioned to respectively extract and separate the plurality of frequency components from the optical signal in the first waveguide;

a plurality of modulators respectively associated with the plurality of drop filters, each modulator being capable of modulating the frequency component extracted by the drop filter associated with the modulator; and

a second waveguide into which the frequency components from the modulators are directed.

47. (New) The system of claim 46, further wherein each of the modulators is responsive to an electrical signal that the modulator encodes in modulation of the associated frequency component.

48. (New) The system of claim 1, wherein the second circuit further comprises:

a photonic bandgap crystal containing a plurality of defects, wherein each of the defects acts as a drop filter for a different wavelength of light; and

a plurality of detectors respectively associated with the plurality of defects, wherein each detector generates an electrical signal that indicates a modulation of a light signal extracted by the associated defect.

49. (New) The system of claim 1, wherein the second circuit comprises:

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a waveguide for an optical signal that includes the first optical signal as a frequency component;

a plurality of drop filters positioned to respectively extract a plurality of frequency components from the optical signal in the waveguide; and

a plurality of detectors respectively associated with the plurality of drop filters, each detector being capable of detecting modulation of the frequency component corresponding to the drop filter associated with the detector.

50. (New) The system of claim 42, further wherein each of the detectors generates an electrical signal indicating a modulation of the frequency component that the corresponding drop filter extracts from the waveguide.

51. (New) An interface of an integrated circuit, comprising:

a waveguide for an optical signal that includes a plurality of frequency components;

a plurality of resonators adjacent to the waveguide, wherein the resonators respectively correspond to the frequency components, and each of the resonators provides a path for the corresponding frequency component; and

a plurality of electrical elements respectively associated with the resonators.

52. (New) The interface of claim 51, further comprising a photonic bandgap crystal.

53. (New) The interface of claim 52, wherein the waveguide comprises a defect in the photonic bandgap crystal.

54. (New) The interface of claim 52, wherein each of the resonators comprises a defect in the photonic bandgap crystal.

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55. (New) The interface of claim 51, wherein each of the resonators comprises a drop filter that extracts the corresponding frequency component from the optical signal in the waveguide.

56. (New) The interface of claim 55, wherein each of the electronic elements comprises a photodetector that generates an electric signal from the frequency component

extracted by the resonator.

57. (New) The interface of claim 51, wherein each of the resonators feeds the corresponding frequency component into the waveguide.

58. (New) The interface of claim 57, wherein each of the electronic elements comprises a modulator that modulates the frequency component that the associated resonator feeds into the waveguide.

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